PROTOTYPE

This unit is for testing/demonstration purposes only.

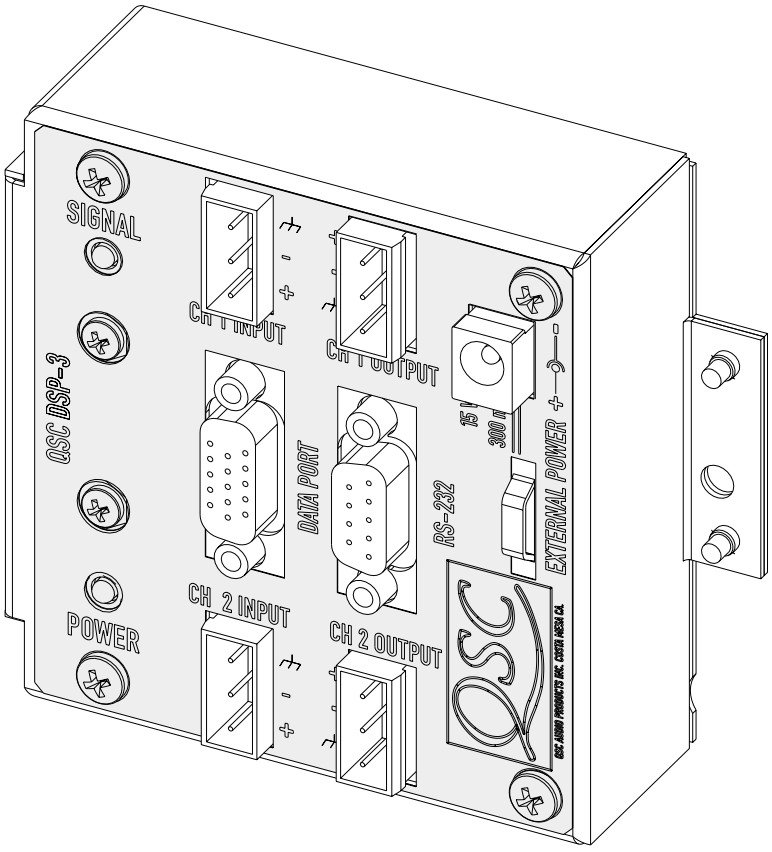
Use with caution.

Unit must be returned to QSC upon completion of testing.

This unit is a prototype and is not for sale.

This unit has not been fully tested or qualified.

DSP-3
Digital Signal Processor
Amplifier Accessory Hardware Manual



TD-000087-00
Rev.2

APPLICATION NOTES:

•Full feature set, Direct-mounting, No external power or special interconnect cables required.

The DSP-3 is fully compatible with the following QSC Audio Products power amplifiers:

CX series:	**DCA series:**	**PL2 series:**	**PL2A series:**
CX302	DCA1222	PL218	All
CX302V	DCA1622	PL224	
CX502	DCA2422	PL230	
CX602V	DCA3022	PL236	
CX702	DCA3422		
CX902			
CX1102			
CX1202V			

•Remote Mounting Required, DSP Remote Mount Cable required: Full feature-set, no external power required.

The DSP-3 will need to be remotely mounted (accessory remote mount available) and connected to the amplifier's DataPort with a DSP Remote Mount cable (like a VGA cable but pin #9 is provided) when used with the following amplifiers:

CX series:	**DCA series:**
CX204V	DCA1644
CX254	DCA1824
CX404	

•Remote Mounting, DSP Remote Mount Cable and External Power required: Full feature-set.

Powerlight series:		
PL1.0	PL2.0HV	
PL1.0HV	PL2.4MB	
PL1.4	PL3.4	
PL1.5X	PL4.0	
PL1.6HVX	PL6.0*	**** Powerlight 6.0 and 9.0 MUST have pin #9 removed from the DataPort Cable before use!***
PL1.8	PL9.0*	

•Reduced Feature-set, Remote Mounting and External Power required, No DataPort Connection possible:

MX series:	**USA series:**	**PLX series:**	**RMX series**	**non-QSC Amplifiers:**
All	All	All	All	All

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EXPLANATION OF GRAPHICAL SYMBOLS

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to humans.

The exclamation point within an equilateral triangle is intended to alert the users to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

EXPLICATION DES SYMBOLES GRAPHIQUES

Le symbole éclair avec point de flèche à l'intrérieur d'un triangle équilatéral est utilisé pour alerter l'utilisateur de la presence à l'intérieur du coffret de "voltage dangereux" non isolé d'ampleur suffisante pour constituer un risque d'elétrocution.

Le point d'exclamation à l'intérieur d'un triangle équilatéral est employé pour alerter les utilisateurs de la présence d'instructions importantes pour le fonctionnement et l'entretien (service) dans le livret d'instruction accompagnant l'appareil.

ERKLÄRUNG DER GRAPHISCHEN SYMBOLE

Der Blitz nach unten zeigendem Pfeil in einem gleichseitigen Dreieck weist den Benutzer auf das Vorhandensein einer unisolierten, „gefährlichen Spannung" im Gehäuse hin, die stark sein kann, einer Person einen elektrischen Schlag zu versetzen.

Das Ausrufzeichen in einem gleichseitigen Dreieck weist den Benutzer auf wichtige Betriebs- und Wartungs- vorschriften in den beiliegenden Unterlagen des Gerätes hin.

CAUTION: To reduce the risk of electric shock, do not remove the cover. No user-serviceable parts inside. Refer servicing to qualified service personnel.

WARNING: To prevent fire or electric shock, do not expose this equipment to rain or moisture.

ATTENTION: Pour eviter les risques de choc électrique, ne pas enlever le couvercle. Aucun entretien de pièces intérieures par l'usager. Confier l'entretien au personnel qualifié.

AVIS: Pour eviter les risques d'incendie ou d'électrocution, n'exposez pas cet article à la pluie ou a l'humidité.

VORSICHT: Um das Risiko eines elektrischen Schlages zu vermindern, Abdeckung nicht entfernen! Keine Benutzer Wartungsteile im Innern. Wartung nur durch qualifiertes Wartungspersonal.

WARNUNG: Zur vermeidung von Feuer oder elektrischen Schlägen, das Gerät nicht mit Regen oder Feuchtigkeit in Berührung bringen!

SAFEGUARDS

Electrical energy can perform many useful functions. This unit has been engineered and manufactured to assure your personal safety. Improper use can result in potential electrical shock or fire hazards. In order not to defeat the safeguards, observe the following instructions for its installation, use and servicing.

PRECAUTIONS

L'énergie électrique peut remplir de nombreuses fonctions utiles. Cet appariel a été conçu et réalisé pour assurer une sécurité personnelle entiére. Une utilisation impropre peut entraîner des risques d'électrocution ou d'incendie. Dans le but de ne pas rendre inutiles les mesures de sécurité, bien observer les instructions suivantes pour l'installation, l'utilisation et l'entretien de l'appareil.

Federal Communications Commission (FCC) Information

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his or her own expense.

Section 1: Introduction- Overview

The DSP-3 is a digital signal processor (*or DSP*) accessory for audio power amplifiers designed to reduce the need for external signal processing while increasing overall system reliability through distributed intelligence. It is intended primarily for QSC's CX, DCA, and Powerlight2 series amplifiers and mounts directly to the rear panel of the 2-RU models of these amplifiers. Use of the DSP-3 with Powerlight models requires remote mounting, external power supply and use of a special interconnect cable. Refer to page 2 for application information. The DSP-3 can also be used with amplifiers that do not have a QSC DataPort (older QSC models, non-QSC models) with a reduced feature set and "remote" mounting/external power.

The signal processing capabilities include an Input Compressor, multiple Parametric Filters, High- and Low-Pass Filters, a Shelf Filter, Muting, Attenuation, Multiple Delays, Polarity Reversal, Audio Routing and Post Crossover Audio Mixing. Analog to digital and digital to analog converters are 24 bit resolution, 48 kHz. sampling rate. Additionally, the post-DSP output signals are daisy-chainable for connection to a second amplifier. Input sensitivity is selectable and dynamic range is greater than 95 dB. Inputs and the post-DSP outputs are electronically balanced. See page 8 for complete listing.

Physically, the DSP-3 is a small module that "piggybacks" onto the back panel of the specified QSC amplifiers. It connects directly to the DataPort on the back panel and is secured with supplied hardware. When used with other amplifiers, the DSP-3 is mounted remotely on a rack-mount accessory that provides a solid physical mounting platform.

Connections include two D-sub type connections; a DB-9 connector acts as the RS-232 interface and an HD-15 through-connector provides the DataPort interface to a CM16a Amplifier Network Monitor (if used). The amplifier-side of the DSP-3 has the other end of the HD-15 through-connector that mates to the DataPort on the rear panel of the amplifier. The "exposed" side has two input connectors and two post-DSP outputs; these are 3-pin detachable terminal block connectors (also known as "Euro" or "Phoenix" style connectors). There is also a 2.5mm barrel-type (coaxial) power receptacle for using the DSP-3 with older QSC amplifiers and non-QSC amplifiers. There are two LED's, a blue one to indicate power status and a green one to indicate the presence of an input signal to the DSP-3.

Control of the DSP-3 is accomplished with the supplied stand-alone software. Please refer to the software documentation for feature-set and operation information. This software provides an easy-to-use graphical user interface where DSP "objects" are drag-and-drop placed onto a palette and interconnects are drawn. This interface allows for almost infinite configuration possibilities for the end user. Connection of the DSP-3 to the host computer is accomplished by either RS-232 computer port connection or by QSC's CM16a Amplifier Network Monitor. Once the DSP-3 has been setup as desired, connection to the host is no longer required. This feature allows essentially tamper-proof amplifier DSP setup. Further changes can be implemented in the field by simply connecting a host (i.e. laptop computer) and loading the new setup into the DSP. Password protection is standard.

***Note:* Powerlight 6.0 and Powerlight 9.0 amplifiers require that pin #9 be removed from the remote mounting interconnect cable. Amplifier damage may result from use of cable that has pin #9 connections present. Normal VGA computer monitor cables have pin #9 removed and are usable. Check before use!**

Section 1: Introduction- Basic Connector & Indicator Descriptions

Below are listed the connector and indicator callouts as they appear on the DSP-3. The bold type indicates the actual labeling on the DSP-3. A brief description of each is provided.

"Front"-side connectors & indicators-

CH 1 INPUT- This 3-pin terminal-block jack is where you connect the audio line level input to the DSP-3's channel #1 input block. It is an electronically balanced input with an input impedance of 7.5k Ohm (7,500 Ohms). When used in an unbalanced configuration, the input impedance is 3.7k Ohms (3,700 Ohms).

CH 2 INPUT- Same description as CH1 INPUT, but assigned to the DSP-3's channel #2 input block.

CH 1 OUTPUT- This 3-pin terminal-block jack provides post-DSP (processed) signal from the DSP-3 for daisy-chaining the processed signal to a second amplifier. If using one amplifier only, this output can be unused or used as a monitor source. In the case of non-DataPort amplifiers, this is the DSP-3 output that gets connected to your amplifier's input connector. Signal source is the DSP-3's channel #1 output block.

CH2 OUTPUT- Same as description as CH 2 OUTPUT only the signal source is the DSP-3's channel #2 output block.

Keep in mind that cross-routing is possible with the DSP-3. This means that the signal input as CH 1 can be routed to CH 2 output (and vice versa).

DATA PORT- This HD-15 female jack is where you would connect the CM16a Amplifier Network Monitor (if used). The CM16a allows full-featured amplifier monitoring (output power and load impedance measurements, internal amplifier temperature monitoring and much more). Additionally, zone paging and other control features are provided.

RS-232- This DB-9 female jack is where the interconnecting serial cable to the host computer is plugged in.

EXTERNAL POWER- This jack is utilized when the DSP-3 is used with QSC Powerlight, MX, USA, PLX, RMX, or non-QSC amplifiers. External power is not required for all other directly-mounted-to-amplifier situations. We recommend the use of the QSC external power supply as it has been fully tested with the DSP-3 to assure trouble-free operation. The power requirements for this jack are 15 Volts DC, 300 milliAmperes (mA), with the center of the plug being POSITIVE (+) and the outside being NEGATIVE (-). The size of the plug is: 2.5mm (0.100 inch) ID, 5.5mm (0.218 inch) OD and a length of 9.5mm (0.375 inch).

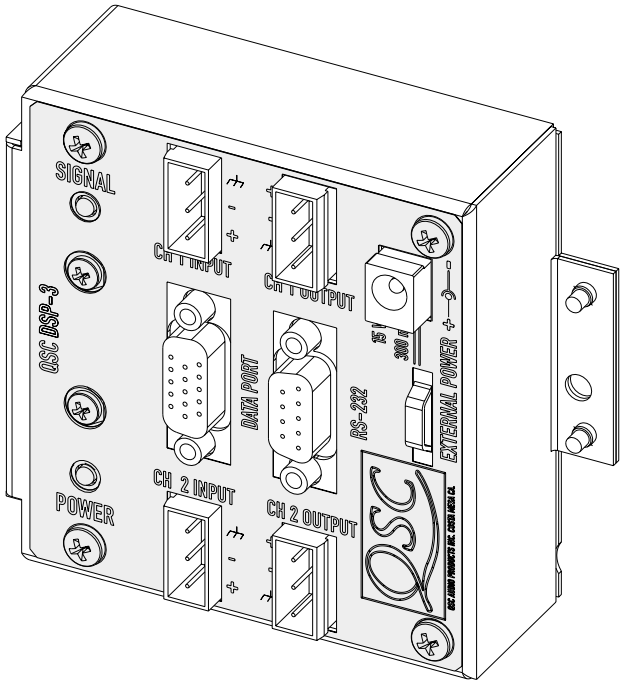
POWER indicator- This blue LED illuminates when the DSP-3 has power properly applied to it.

SIGNAL indicator- This green LED illuminates when the DSP-3 detects an input signal on either channel.

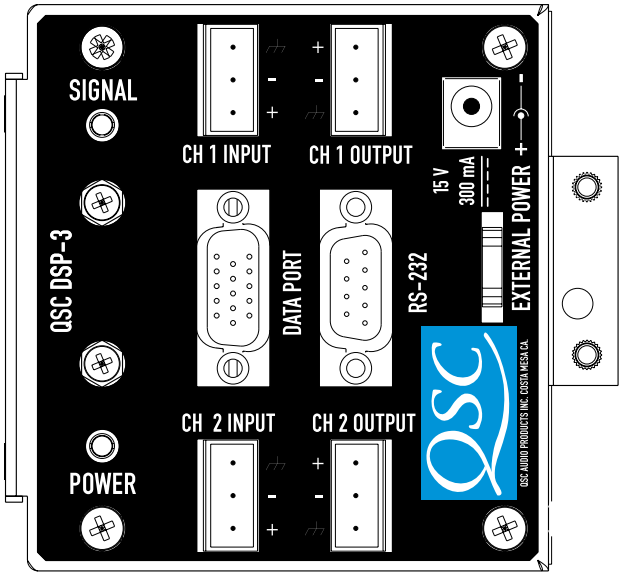
"Back"-side connector-

DataPort jack- This unlabeled HD-15 male jack is where amplifiers with a DataPort are connected to the DSP-3. When used in applications where the DSP-3 is mounted directly to the amplifier, this jack plugs directly into the female jack on the rear of the amplifier, requiring no cable. When used in applications with QSC amplifiers where "remote" mounting is required, this is where you would make the amplifier to DSP-3 cable connection. When used with non-DataPort equipped QSC amplifiers or non-QSC amplifiers, this connection is unused and the feature set of the DSP-3 is reduced. ***When connecting to Powerlight 6.0 & 9.0 amplifiers, pin #9 must not be present on the interconnecting cable between the DSP-3 and Powerlight 6.0 or 9.0 or amplifier damage may result!***

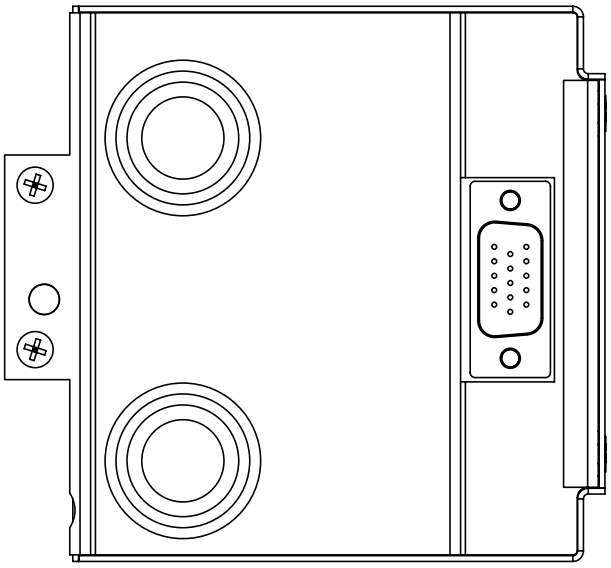
Section 1: Introduction- Physical Layout Illustration



DSP-3 Overall view



DSP-3 "front" panel (exposed side)



DSP-3 "rear" panel (amplifier side)

Section 1: Introduction- List of Functions & Features

DSP-3 Hardware Features (full set available to QSC DataPort equipped amplifiers):

High- and Low-Pass Crossover Filters

Selectable responses: Butterworth (6,12,18 or 24 dB per octave slope)
Bessel (6,12,18 or 24 dB per octave slope)
Linkwitz-Riley (12 or 24 dB per octave slope)

Graphical response curve provided in software
Apply Filter (filter in or out)
Adjustable frequency & slope
Ability to bypass all EQ with a single command
Ability to add or delete EQ
Assignable anywhere in signal chain

High- and Low-Pass Shelf Filter

Adjustable corner frequency
Adjustable Q factor
Adjustable gain
Graphical response curve provided in software
Apply filter (filter in or out)
Ability to bypass all EQ with a single command
Ability to add or delete EQ
Assignable anywhere in signal chain

Output Peak Limiter

Adjustable threshold
Adjustable attack time
Adjustable release time
Graphical response curve provided in software
Ability to quickly bypass limiter
Apply limiter (limiter on or off)
Assignable anywhere in signal chain

Multiple Delays

910 millisecond maximum, 20.83 microsecond increments,
Entry can be in seconds, feet or meters
Assignable anywhere in signal chain.

Section 1: Introduction- List of Functions & Features

Parametric EQ	Adjustable frequency
	Adjustable gain
	Adjustable Q factor
	Ability to bypass all EQ with a single command
	Ability to add or delete EQ
	Assignable anywhere in the signal chain
	Apply EQ (EQ in or out)
Signal Compressor	Adjustable attack and release times
	Adjustable threshold
	Adjustable compression ratio
	Graphical response curve provided in software
	Assignable anywhere in the signal chain
	Apply compressor (compressor in or out)
Signal Level Meter	Peak or rms response

Signal Attenuation **(mute or bypass)**

Mix Post Crossover Audio **(2 to 1 mixer with** ***mute*** **and** ***lock all channels*** **featured)**

Signal Splitter

External Contact Closure Sensing (for triggering software "events")

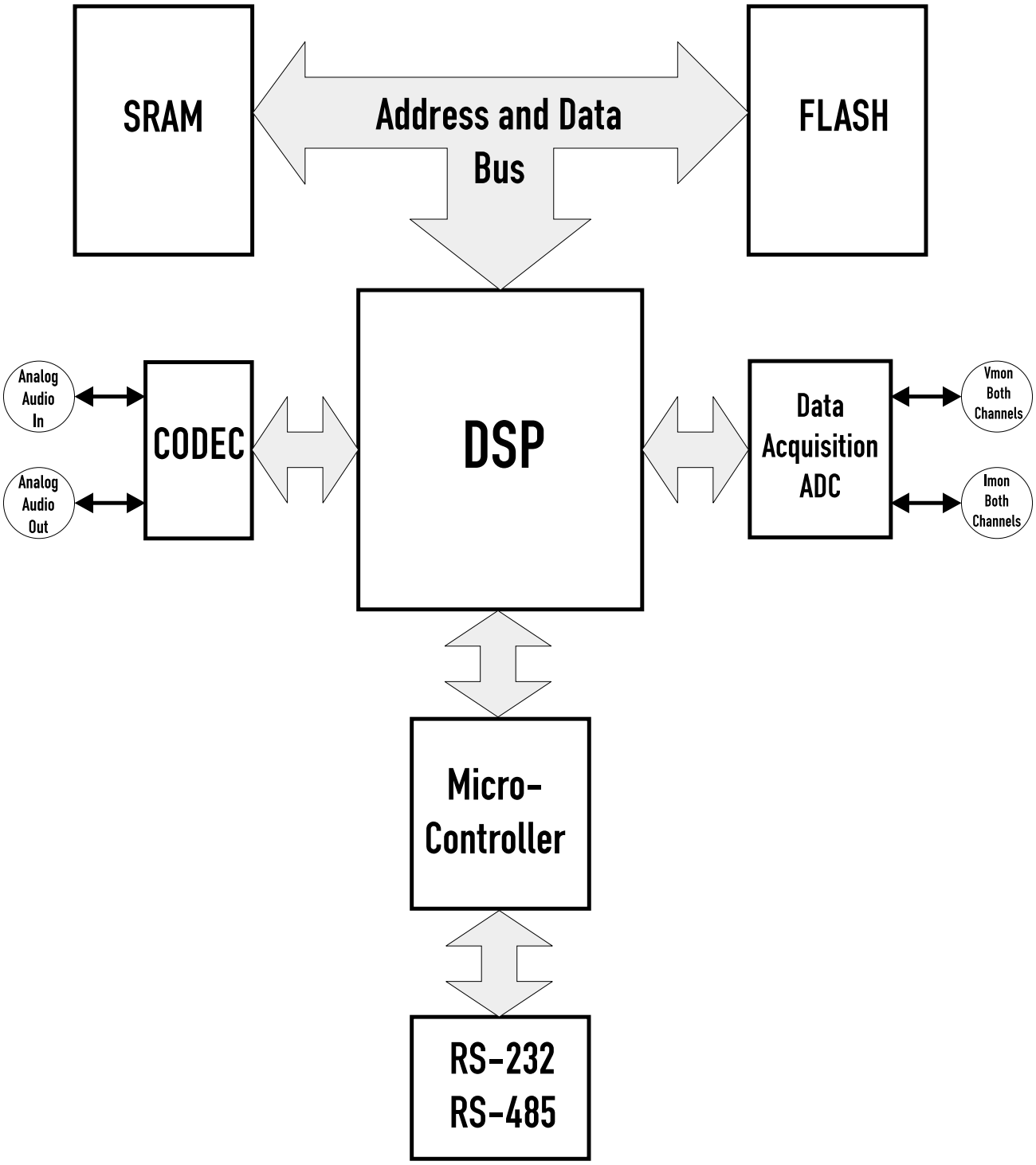
Pink & White Noise Generator

Variable Frequency Tone Generator

Clip & Protect Indication at Amplifier Outputs

Signal Polarity Reversal

Section 1: Introduction- Block Diagram



Section 1: Introduction- Technical Overview

This portion of the introduction provides some of the technical details of the DSP-3.

Audio Input Path

There are two audio channels each with two input connectors, a balanced 3-pin 'euro' terminal block jack and a pseudo balanced DataPort input. The inputs are protected with a filter that prevents radio frequency interference. Each input has a selectable input sensitivity of -10dBV, +4dBu, +12dBu, or +18dBu to properly scale the input signal to the CODEC inputs. The DataPort is scaled to clip with a signal that is +10dB compared to the 'euro' input. Each CODEC input is diode protected to prevent any large signal from destroying its inputs.

Audio Output Path

The first stage the audio passes through after the CODEC is an inverting gain stage that takes advantage of the op amp's CMRR. The second stage of the output is a second order Butterworth low pass filter that removes high frequency sampling artifacts. The signal is then sent out of the DSP-3 through the DataPort or the output 'euro' connectors. The output level is selectable from 0dB or -6dB.

Power Supply

No external power supply is needed for use with the CX, DCA and PL2 series amplifiers (or more recent QSC amplifier models released after printing of this manual). With these models, the DSP-3 is supplied power from the amplifier via the DataPort (HD-15) connection.

When used with the Powerlight series of amplifiers, the DSP-3 requires use of the external supply. The external supply is also used when connecting to non-QSC amplifiers (or any amplifier that does not have a DataPort). External power is provided by the included power supply ("wall wart") via a coaxial power cord jack on the back of the DSP-3.

When using the external power source, we recommend that the DSP-3 be powered-up before the amplifier in order to insure trouble-free start-up. This will also avoid the possibility of "thumps & bumps" should the DSP-3 be powered up after the amplifier.

Data Acquisition

The DSP-3 samples the I_{MON} and V_{MON} lines of QSC amplifiers (via the DataPort) in order to perform dynamics (limiter, compressor, etc.) processing. The four inputs (I_{MON} and V_{MON} for both channels) are continuously sampled by a four channel ADC. **When used with non-QSC amplifiers or QSC amplifiers that have no DataPort, dynamics processing is not available.** This is because there are no Imon and Vmon lines for the DSP-3 to sample in the absence of a DataPort connection.

Contact Closure

One contact closure input is provided. It uses pin 9 of the RS-232 DB-9 connector (not normally used for RS-232). Shorting this pin to ground with a maximum impedance of 1.3 kOhms will cause a general purpose I/O pin of the DSP to be pulled to a logic low. This provides the user with an event that can be used in software for many purposes.

Section 2: Installation- Basics and Mounting

UNPACKING

There are no special unpacking precautions for the DSP-3. However, it is recommended that you keep the original packing material for reuse in the rare event that service be required for your DSP-3. If service is required and the original packing material is not available, insure that the DSP-3 is adequately protected for shipment (strong box of appropriate size , sufficient packing material).

WHAT IS INCLUDED IN THE CARTON:

Item	Description	Quantity
1-	DSP-3 Digital Signal Processor	1
2-	3-pin terminal block connector plug	4
3-	#4-40 machine screw, 1.125" long	2
4-	#8-32 machine screw, 0.312" long	1
5-	Hardware Manual (this document)	1

DIRECT MOUNTING THE DSP-3 TO 2-CH, 2-RU QSC DATAPORT EQUIPPED AMPLIFIERS (CX, DCA, Powerlight2)

The DSP-3 mounts directly to the rear of 2-channel, 2-RU, DataPort equipped QSC amplifiers.

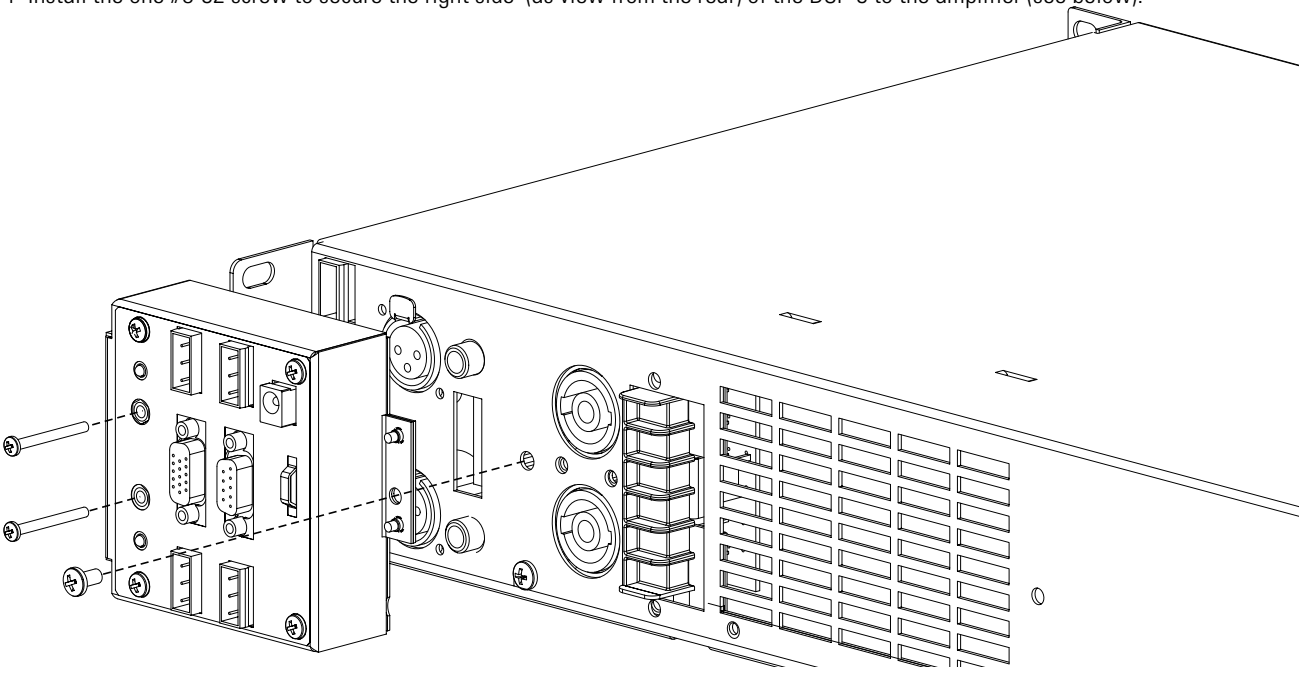
1- Configure the amplifiers DIP switches (QSC amplifiers where the DSP-3 covers the configuration switches) as follows:

- All filters off
- Clip limiter off
- Mode set as required

2- Align the DataPort plug on the back of the DSP-3 with the DataPort jack on the back of the amplifier and gently push the DSP-3 to seat the connector.

3- Install the two #4-40 screws to secure the left side of the DSP-3 to the amplifier. These two long screws pass through the DSP-3 and thread into the inserts on the DataPort (HD15) jack. (see below).

4- Install the one #8-32 screw to secure the right side (as view from the rear) of the DSP-3 to the amplifier (see below).



Section 2: Installation- Remote mounting (4-ch., Powerlight & non QSC amp's)

REMOTE MOUNTING THE DSP-3 : 4-Channel CX and DCA , Powerlight series, and all non-QSC amplifiers

Use of the DSP-3 with the 4-channel CX and DCA and all Powerlight amplifiers requires the remote mounting of the DSP-3. Use with non-QSC amplifiers also requires remote mounting. Keep in mind that all applications that use amplifiers that do not have a DataPort (i.e. non-QSC amplifiers) the dynamic processing capabilities of the DSP-3 will not be available.

Accessory Remote Mounting Bracket- This accessory is a 19", 2-RU panel with mounting facilities for up to 4 DSP-3 modules.

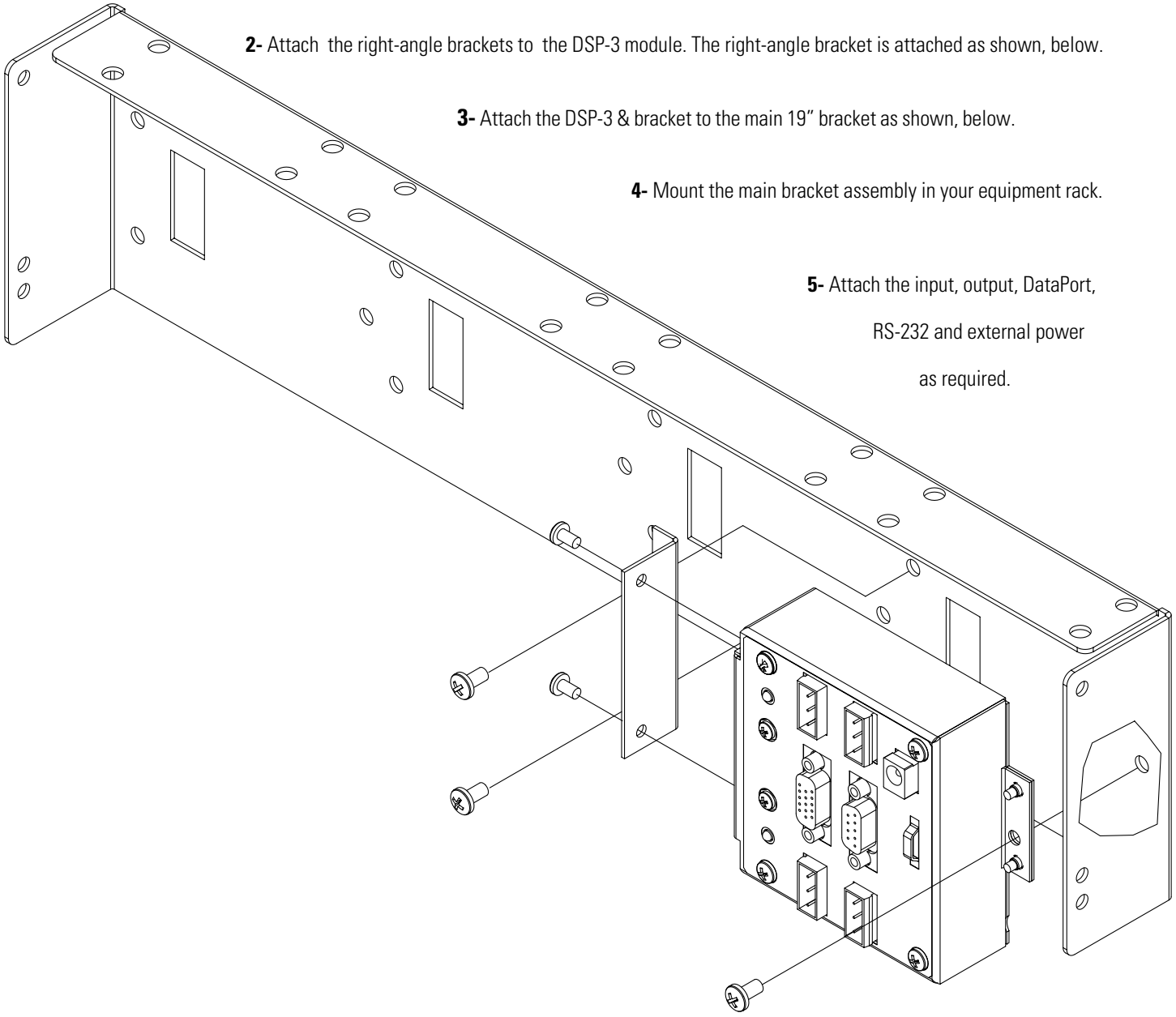
1- The accessory external mounting bracket kit comes with one large bracket (the 19", 2-RU size) and four smaller right-angle brackets that are used for securely mounting up to four DSP-3's in a 2-RU space. Adjustable rack ears are included for maximum mounting flexibility.

2- Attach the right-angle brackets to the DSP-3 module. The right-angle bracket is attached as shown, below.

3- Attach the DSP-3 & bracket to the main 19" bracket as shown, below.

4- Mount the main bracket assembly in your equipment rack.

5- Attach the input, output, DataPort, RS-232 and external power as required.

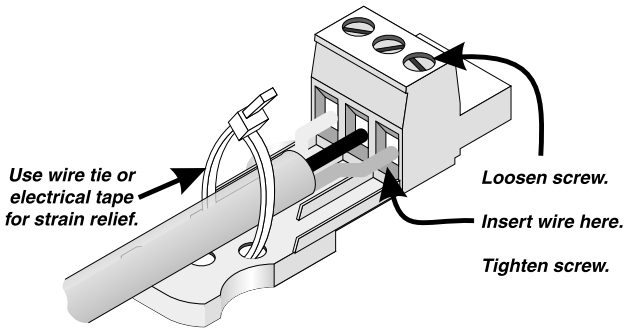


Section 2: Installation- Connections

CONNECTING AUDIO INPUTS AND OUTPUTS:

Whenever possible, use balanced connections for the lowest possible noise levels and for minimizing the possibility of hum inducing ground loops. The audio inputs and outputs of the DSP-3 use 3-pin "Phoenix"-type (Euro-style) terminal block connectors. These connectors allow pre-wiring of inputs without any soldering and allow for rerouting of audio inputs by simply interchanging connector locations without the need for any tools. See Appendix for connector manufacturer's part number reference.

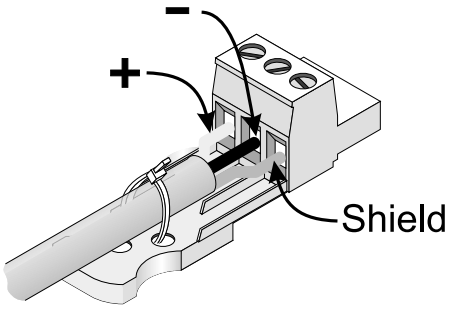
To connect your signal wire to the terminal-block plug simply back the screws out a few turns to open the wire-clamp, carefully insert the conductors into the proper location, and re-tighten the clamping screw.



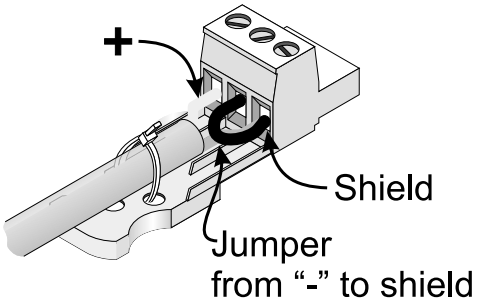
The recommended stripping length for the wires is approximately 6 to 8 mm (1/4 to 5/16 inch). When stripping the audio cable, be careful not to nick or cut the conductor strands. After each conductor has been stripped and dressed, insert it fully into the connector and tighten the retaining screw. When stranded wire is used, carefully twist the conductor strands together so that when they are inserted into the connector assembly, no loose strands short adjacent terminals.

Balanced connection is recommended for all inputs. The terminal block inputs on the DSP-3 are electronically balanced. Balanced input cables are recommended to minimize noise pick up and prevent ground loops.

With the connector oriented as shown at the right, connect the positive (+) signal wire to the left-most



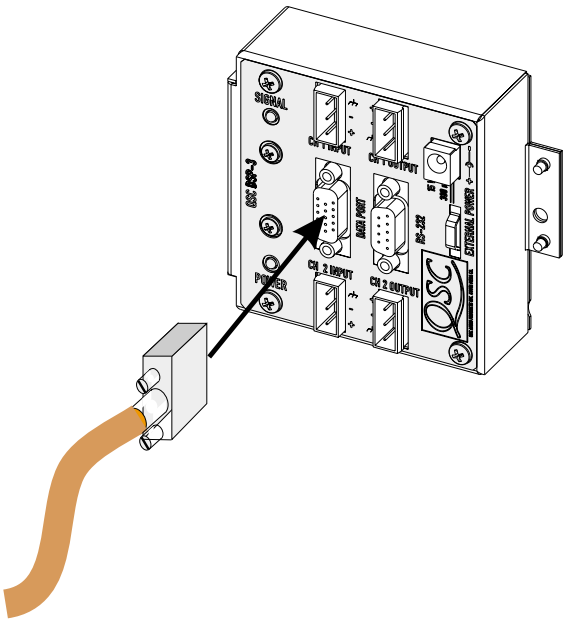
Unbalanced inputs can be used if required. If unbalanced audio sources are used, it is preferable to use an appropriate audio transformer (or other unbalanced-to-balanced "converter") to provide a balanced input to the DSP-3. If this is not possible, then **it is recommended that the negative terminal and shield terminal be connected to one another with a jumper wire.**



When using a CM16a Amplifier Network Monitor with the DSP-3, the input signal for channel 1 &2 are provided by the DATA PORT connection. The CH 1 INPUT and CH 2 INPUT connectors should not be used when the DSP-3 is connected to a CM16a Amplifier Network Monitor.

Section 2: Installation- Connections

CONNECTING TO THE DATAPORT- This section applies to those users interfacing with the QSC CM16a Amplifier Network Monitor and those users interfacing the DSP-3 to a PL6.0 or PL9.0 amplifier.



DataPort Connection: 15-pin Cable

This connection is made with a ***special 15-pin cable*** similar to VGA computer monitor cables. Do not use VGA cables as they are not supplied with pin #9 (*exception PL6.0 and PL9.0 MUST use VGA type cable or the special cable with pin #9 removed*). The plugs and jacks are the same physical size as the RS-232 connections; be careful not to get them confused.

The DataPort connection from the DSP-3 to QSC amplifiers is made when mounting the DSP-3 to the rear of the amplifier. The DataPort connection from any other accessory to the DSP-3 is made by orienting the connector properly, inserting it fully into the jack and finger-tightening the retaining screws.

The DataPort connection to the DSP-3 is a pass-thru type of connection. The DataPort on the amplifier is used for the connection of the DSP-3 and other QSC products. Once the DSP-3 has been mounted, the DataPort connector on the DSP-3 passes all the required signals through to the amplifier. Simply plug into the DataPort on the DSP-3 as you would any DataPort on an amplifier.

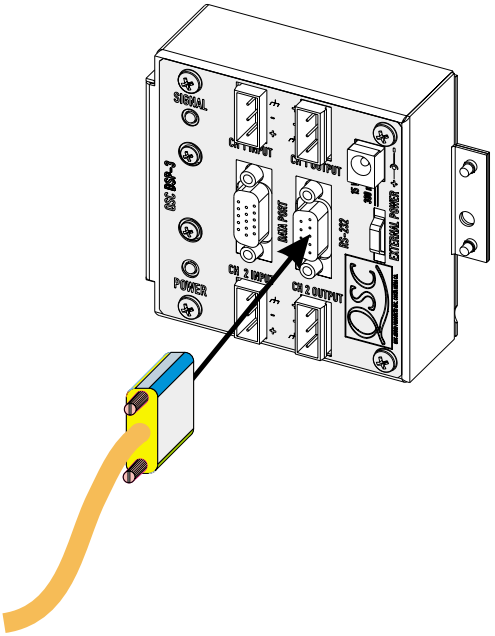
This connection is typically used for connection to an Amplifier Network Monitor such as QSC's CM16a. The CM16a provides for Ethernet control & monitoring of your amplifiers.

Front panel DataPort connection is ***not required*** for the operation of the DSP-3.

CONNECTING TO THE RS-232 PORT

Connection to the RS-232 port is made using a null-modem type 9-pin serial data cable. Just orient the DB-9 plug correctly, insert the plug fully into the RS-232 port and finger-tighten the retaining screws.

All DSP-3 setup and programming takes place through the RS-232 port. Any time setup changes are required to the DSP-3, it must be connected to its host computer through the RS-232 port. If "real-time" control of the DSP-3 is required, the RS-232 port connection must be maintained as well. If "real-time" control is not required, then the DSP-3 can be setup first and then disconnected from the PC. ***The RS-232 connection does not have to be maintained for the DSP-3 to operate.***



RS-232 Connection: 9-pin Cable

Section 2: Installation- Connections

DAISY-CHAINING THE DSP-3 OUTPUTS TO ADDITIONAL AMPLIFIERS

The DSP-3 provides audio output jacks for each channel. These outputs may be used for daisy-chaining the post-DSP signal to other amplifiers or for monitoring purposes. The signal on the output jacks is post-DSP. All signal processing functions done by the DSP-3 effect the signal provided to the output connectors as well.

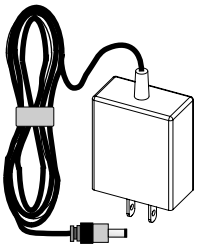
To daisy-chain the DSP output, simply connect the output jacks of the DSP-3 to the input jacks of the next amplifier. Make sure that all interconnecting cables are balanced and connected properly.

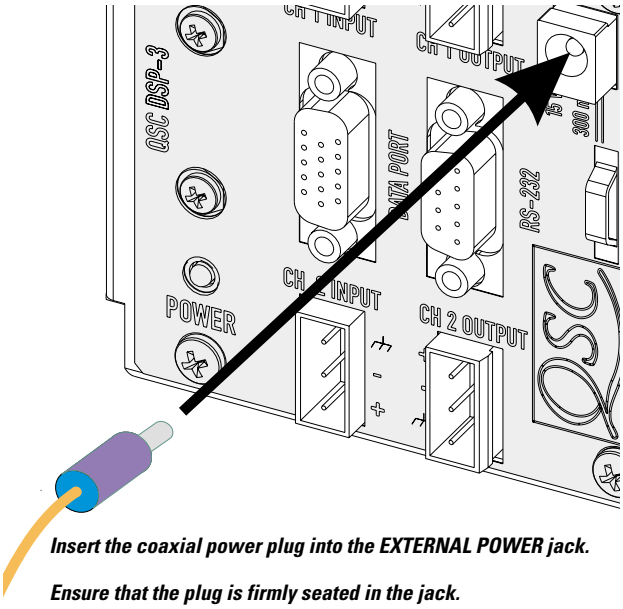
CONNECTION TO ACCESSORY EXTERNAL DC POWER SOURCE

When the DSP-3 is used with QSC Powerlight amplifiers that do not provide the required +15VDC through their DataPort connection OR is used with non-DataPort amplifiers, power must be supplied to the DSP-3 from an external power supply.

QSC offers an accessory external power supply for applications where a DataPort that provides +15 VDC is not available. Contact QSC's Technical Services Department for details. Although ***not recommended***, third-party external power supplies may work with the DSP-3 provided they are of the correct voltage, voltage type (DC) , current rating and polarity. Any damage to the DSP-3 caused by connection to a non-QSC external power supply is not covered under the warranty.

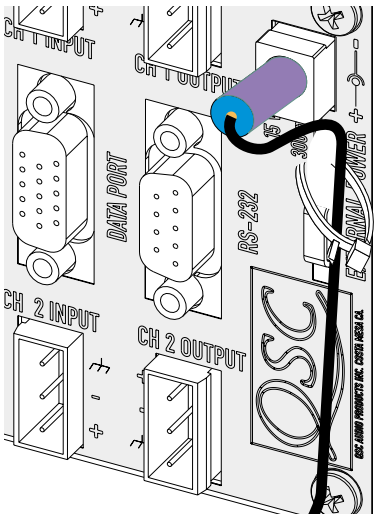
QSC offers an accessory external power supply for applications with non-QSC amplifiers or with QSC Powerlight models that do not provide the required operating voltage.





Insert the coaxial power plug into the EXTERNAL POWER jack.

Ensure that the plug is firmly seated in the jack.



Use the "tab" provided on the chassis for securing the power cord with a tie-wrap (wire-tie).

Ensure that any external power supply connected to the DSP-3 is of the proper voltage type, level and current rating.
Be certain that the connector polarity is correct as there is no industry standard!
Connection to an improper voltage source can cause immediate damage to the DSP-3!

Section 2: Installation- Software Installation & BETA Release Warning

These instruction apply to the June, 2000 BETA release of the Signal Manager application.

Software Installation-

1. Insert the CD labeled QSC DSP-3 Signal Manager into your CD drive (typically drive "D:").

2. Run D:\Setup.exe and follow the instructions displayed.

3. When the installation is complete, you will be presented with a screen that asks you to view the "Readme" file. Please take time to read this- it contains important information on how to use the software.

4. After installation, you should have an icon on your desk top labeled "Signal Manager". Use this icon to start the application.

5. Using the main menu bar at the top of the window, choose the "Help" item and read the Introduction section.

6. IMPORTANT NOTE! The DSP-3 is shipped with all of its pre-sets configured to pass full-range audio signals through both channels, unless the external contact closure is in the closed position (in which case the output of the DSP-3 is muted).

THIS MAY NOT BE APPROPRIATE FOR YOUR SETUP! BE sure to configure any necessary crossovers , filters, etc. prior to applying audio signals to the inputs. Damage to equipment may result if these recommendations are not followed.

7. Please refer to the "Readme.txt" file for information on how to provide your feedback on this BETA release product to QSC Audio Products.

OVERALL NOTES AND WARNING-

• The BETA RELEASE software supplied with the DSP-3 has not been fully qualified to use in a "show" setting.

• Use caution when making changes to parameters in a "live" configuration. There are some known problems with undesirable transients when changing filter parameters (especially at low frequencies).

• Certain DSP-object configurations have been observed to cause the DSP-3 to perform an auto-reset. This will result in muting of the audio and subsequent re-loading of the power-on-default configuration. It is HIGHLY RECOMMENDED that you establish a power-on-default "preset" that corresponds to your particular equipment setup (such as appropriate crossover filters, gain settings, input sensitivities ect.). Do this as soon as possible so as to reduce the risk of equipment damage that could result should an inappropriate DSP configuration be applied. See the release notes in the software's "Readme.txt" file for more details.

Section 3: Specifications

Input Signal Processing

Frequency response	20 Hz–10 kHz ±0.3 dB 20 Hz–20 kHz ±0.7 dB
Distortion	<0.01% THD+N @ +4 dBu out
Dynamic range	>95 dB unweighted 20 Hz–20 kHz
Polarity	In-phase or inverted
Mute	>90 dB attenuation

Inputs

Program inputs	2
Connector type	"Phoenix-style" (a.k.a. "Euro-style") detachable terminal blocks
Type	Electronically balanced
Grounding	All shield terminals connected to chassis
Input sensitivity	-10dBV, +4dBu, +12dBu, +18dBu selectable
Impedance	7.5 K Ohm balanced 4.2 K Ohm unbalanced
Common-mode rejection	Typical, >50 dB, 20 Hz–20 kHz Worst Case, >40 dB at 20 kHz rolling off to >40 dB at 20 kHz
Crosstalk (inter-channel within Data Port pair)	>75 dB separation, 20 Hz–20 kHz

Outputs

Program outputs	2 (via HD-15)
Connector type	HD-15 DataPort connection
Pinout	Special, see appendix
Cable type	VGA monitor cable
Qualified length	2 meters
Daisy-chain output	2 (1 per channel)
Connector	"Phoenix-style" (a.k.a. "Euro-style") detachable terminal blocks
Type	Electronically balanced
Grounding	Shield terminal connected to chassis
Output level	0dB, -6dB selectable
Output impedance	600 Ohms balanced

Power amplifier connectivity

Power amplifier interface

Compatibility	all QSC and non- QSC amplifiers
Full-feature set	all QSC DataPort equipped amplifiers
Connector and cable	HD-15 VGA cable, 2 meters length qualified (for longer runs, contact QSC's Technical Services Department)

Amplifiers	one 2-Ch. amplifier per DSP-3

Amplifier status monitor

Clip indicator	Senses channel clipping
Protect indicator	Senses amplifier protect status

RS-232 Port

Cable Type	Null-Modem (a.k.a. Laplink)

Contact closure input (sense)

Inputs	1 discrete input
Configuration	Single-ended input
Resistance for closure detect	<1.3 K Ohms
Resistance for open detect	>5 K Ohms

Section 3: Specifications

General

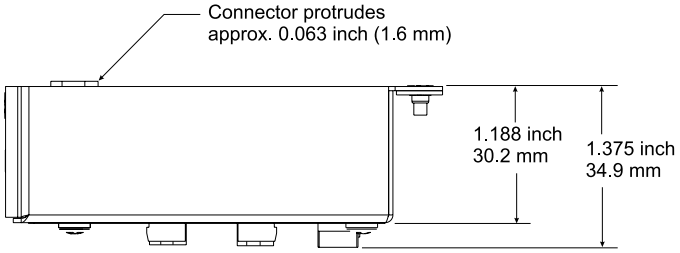
Physical

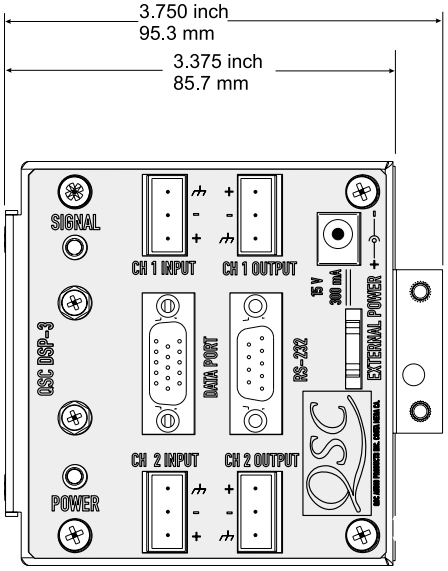
Height	3.50 inches
Width	3.75 inches
Depth	1.38 inches
Weight	0.59 lbs (0.27 kg)
Mounting	Rear support recommended for portable or mobile use
Operating temperature	0 to 50° Celsius

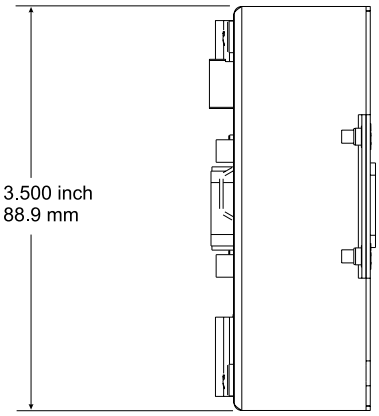
AC Power (applicable for external power supply)

AC Input Voltage	80–240 VAC
AC Input Current	0,3 Amps rms
Frequency	50 to 60 Hz
Output Voltage	15 VDC
Output Termination	Detachable power cord with 2.5mm barrel-type (coaxial) connector center pin is positive

Dimensions







SECTION 4: ARCHITECT'S AND ENGINEER'S SPECIFICATIONS

The Digital Signal Processor (DSP) shall provide two independent channels of DSP for signal delivery to QSC DataPort equipped power amplifiers. The processing shall be distributed with the DSP module mounted directly to the rear of the power amplifiers.

Output Peak Limiter—For each audio channel, the DSP shall provide a peak limiter that is assignable anywhere in the signal chain and can be switched on or off. The limiter shall provide the following adjustments:

Gain

Threshold

Attack time

Release time

High- and Low-Pass Crossover Filters—For each channel of audio, the DSP will provide high-pass and low-pass crossover filters that are assignable anywhere in the audio chain. The crossover filters must be capable of being switched in or out of the signal chain. The DSP shall provide the following crossover responses:

Butterworth (6,12,18,24 dB per octave slope)

Bessel (6,12,18,24 dB per octave slope)

Linkwitz-Riley (12 & 24 dB per octave slope)

High- and Low-Pass Shelf Filters—For each audio channel, the DSP shall provide high-pass and low-pass shelf filters that are assignable anywhere in the audio chain. The shelf filters must be capable of being switched in or out of the signal chain. The DSP shall provide the following shelf filter adjustments:

Variable corner frequency

Variable gain

Variable slope

Compressor-- The DSP shall provide a signal compressor that is assignable anywhere in the signal chain. It shall have adjustable threshold, attack time, release time, and compression ratio.

Contact Closure I/O—The DSP shall provide a trigger output usable for contact-closure (or other) purpose which shall be CMOS & TTL signal compatible.

Power Supply—The DSP shall be provided power through its DataPort connection to QSC amplifiers. For older amplifiers or non-QSC amplifiers, a coaxial power jack will be provided on the DSP for connection to an external power source. Power required shall be +15 VDC at 300 mA (max.).

Amplifier Interface—The DSP shall attach directly to the rear of each power amplifier. The DSP's interface to each power amplifier Data Port shall be via an HD-15 connector. This interface shall transmit two amplifier input audio signals as well as all control and monitoring signals. Special signal conditioning and grounding techniques shall be used in this interface to ensure negligible levels of noise and crosstalk.

Amplifier Output Monitoring—When used with QSC DataPort amplifiers, the DSP shall provide clipping and protect status detection at the amplifier's output terminals.

Noise & Tone Generation-- The DSP shall provide pink and white noise generation capability. It shall also provide for tone generation.

General—All audio inputs and outputs shall be balanced with a nominal input level of +4 dBu and maximum level of +21 dBu. Input connectors shall be of the "Phoenix" detachable terminal block type.

The Digital Signal Processor shall be the QSC DSP-3.

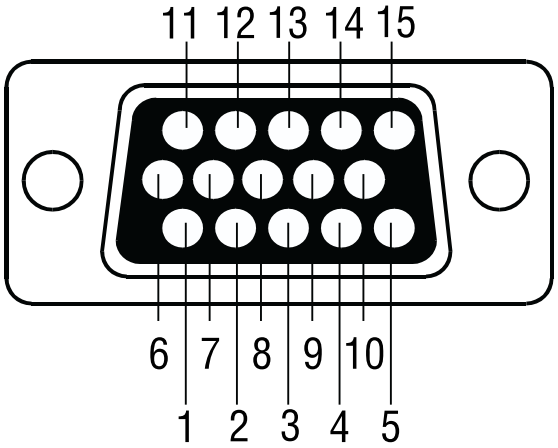
Section 5: Appendix- DataPort Pinout

DATA PORT PINOUT

The diagram below shows the pin assignments used for the HD-15 connectors on the DSP-3 and amplifier.

NOTE!

This information is shown for reference only and is subject to change without notice as the DataPort feature is specific to QSC products and not intended for interface to other manufacturer's equipment.



Note: ***Powerlight 6.0*** ***and*** ***Powerlight 9.0*** ***amplifiers require that pin #9 be removed from the remote mounting interconnect cable.***

Amplifier damage may result from use of cable that has pin #9 connections present.

Normal VGA computer monitor cables have pin #9 removed and are usable. ***Check before use!***

Pin	Signal Description
1	Audio to channel 1 (+)
2	Standby control
3	V_{MON} channel 1 plus encode 1
4	I_{MON} channel 1 plus encode 2
5	Clip/protect channel 1
6	Hard ground
7	Audio to channel 1 (ground)
8	Audio to channel 2 (ground)
9	+15V from amplifier
10	Data reference ground
11	Audio to channel 2 (+)
12	Amp IDR (model ID)
13	V_{MON} channel 2 plus encode 3
14	I_{MON} channel 2 plus encode 4
15	Clip/protect channel 2

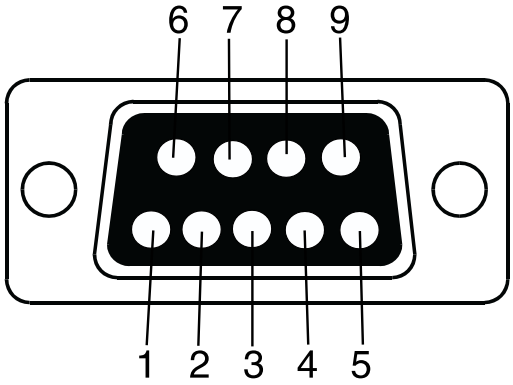
Description of Encode Signals

encode 1	Bridge mode & power detect
encode 2	Temperature, channel 1
encode 3	Standby mode detect
encode 4	Temperature, channel 2

Section 5: Appendix- RS-232 Port Pin-out & Connector P-N's

RS-232 PINOUT: The diagram below shows the pin assignments for RS-232.

Pin	Signal Description
1	DCD
2	RD
3	TD
4	DTR
5	Signal GND
6	DSR
7	RTS
8	CTS
9	contact closure



TERMINAL BLOCK CONNECTOR PART NUMBER REFERENCE- The following manufacturers and part numbers are provided as a reference to users. The information here is subject to change without the knowledge of QSC.

3 pin without integral strain relief: Phoenix Contact - 17 57 02 2; Riacon - 31249103-6; On Shore Tech - EDZ950/3

Strain Relief 3 pin: Phoenix Contact 17 76 16 8

Section 6: How to Contact QSC Audio Products

ADDRESS:

QSC Audio Products, Inc.

1675 MacArthur Boulevard

Costa Mesa, CA 92626-1468 USA

TELEPHONE NUMBERS:

Main Number	(714) 754-6175
Sales Direct Line	(714) 957-7100
Sales & Marketing	(800) 854-4079 toll free in U.S.A. only
Technical Services	(714) 957-7150
	(800) 772-2834 toll free in U.S.A. only

FACSIMILE (FAX) NUMBERS:

Sales & Marketing FAX	(714) 754-6174
Technical Services FAX	(714) 754-6173

WORLD WIDE WEB:

http://www.qscaudio.com

1675 MacArthur Boulevard Costa Mesa, California 92626 USA PH: (714) 754-6175 FAX: (714) 754-6174

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